

ART. IV.—*New or Little-known Victorian Fossils in
the National Museum.*

PART VIII.—SOME PALAEOZOIC BRITTLE-STARS OF THE
MELBOURNIAN SERIES.

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(With Plates VI.-VIII.)

[Read 11th October, 1906].

INTRODUCTORY REMARKS.

An examination of the Silurian Ophiurids and Asterids in the National Museum affords ample proof that our Victorian palaeozoic rocks are nearly as rich in these forms of life as the Ludlow series of Herefordshire and the Lake District in England, or the closely correlated strata of N. America. Both the mudstones and the argillaceous sandstones of the Melbournian division of our Silurian rocks have furnished numerous remains of the former group, the Brittle-stars, and perhaps needless to say, the mudstones retain the sharper impressions of the fossils. So fine-grained, however, is some of the sandstone rock that a sharp positive in wax or plasticine can often be obtained from it, shewing the finer ossicles or even the spines.

The genus newly described here under the name of *Gregoriura* is represented by a large and ornate species possessing somewhat remarkable characters, and for which a place may be found, provisionally, in the family Protasteridae. Another ophiurid, of which further details are now made known, was described by Prof. J. W. Gregory in 1889¹ under the name of *Protaster brisingoides*, and was at the time the only described species of this particular group from Victorian palaeozoic rocks.

¹ Geol. Mag., dec. iii., vol. vi., 1889, p. 24.

The original specimens were from Flemington, and they are incorporated in the collection at the British Museum (Nat. Hist.), London. On account of the peculiar structure of these specimens, Gregory subsequently transferred the species to a new genus, *Sturtzura*, making it the genotype, the genus also including the *Protaster leptosoma* of Salter.¹ The numerous specimens of *P. brisingoides* in the National Museum, Melbourne, having afforded clearer data as to arm-structure than was possible when the original specimens were described in London, this fresh evidence necessitates a somewhat different interpretation of the arrangement and form of the ossicles on the ventral surface, and restores the species to its original genus. As a typical *Protaster*, this fossil has more or less boot-shaped ambulacral ossicles, closely approaching those of *P. biforis*, Gregory.² In consequence of this determination *Sturtzura leptosoma* may now be considered as the type of the genus.

The third form now described is an elegant little species closely related to *Sturtzura leptosoma*, and which I have named on this account *S. leptosomoides*.

DESCRIPTION OF THE SPECIMENS.

Class—OPHIUROIDEA.

Family—*Protasteridae*.

Genus—*Protaster*, Forbes, 1849.

***Protaster brisingoides*, Gregory.**

(Pl. VI., Fig. 2; Pl. VIII., Fig 2).

Protaster brisingoides, Gregory, 1889. Geol. Mag.,
dec. iii., vol. vi., p. 24, woodcuts, figs. 1-4
(p. 25),

Sturtzura brisingoides, Gregory, 1897. Proc. Zool.
Soc. (for 1896), p. 1034.

1 Proc. Zool. Soc. Lond. (1896), 1897, pp. 1034, 1035.

2 Proc. Zool. Soc. (1896), 1897, p. 1033, fig. 3.

Observations.—An extensive series of the above fossil was collected by the first Victorian geological surveyors, from Moonee Ponds Creek, Flemington, then comprised in “Royal Park”; these were deposited in the National Museum collection, and bore the MS. name given by McCoy—“*Taeniaster australis*”¹ McCoy also referred to these fossils in the Progress Report of the Geological Survey of Victoria² under the same MS. name, and they were reported to have come from Melbourne and the Upper Yarra. The latter locality reference would imply that these ophiurids also occurred in the Yeringian series. I had, however, been unable to find any specimens of this group in the Museum collections as from the Upper Yarra district until quite recently, when two examples from the “Parish of Yering, Sect. XII.,” were discovered

Whilst examining in detail the various fossils found in the sandstone at Flemington their general negative character was noticed; and upon taking a wax impression from a remarkably sharp sandstone cast of *P. brisingoides*, the shape of typical protasterid ossicles was revealed, together with a deep sinuous ventral canal. This impression satisfactorily explains the presence of the “median ridge,” the nature of which, Prof. Gregory observed, is doubtful.³ Since the fossils appear to be in the form of negative casts, the ossicle structure of the arm requires a different explanation. Prof. Gregory, kindly replying to a letter giving my own explanation of the structure of this fossil, writes, under date July, 1906, as follows:—“If the specimen can be interpreted as by your drawing it becomes very much easier . . . The sinuous ridge I could not understand, and if it can be explained away so much the better.”

Emended and Additional Description.

As in *P. biforis*, Gregory,⁴ the ambulacral ossicles consist of a thick body and a curved wing, and are in some portions of the

1 See Gregory op. cit., 1889, p. 26; also R. Etheridge, Junr. Records Australian Museum, vol. i., No. 10, 1891, p. 199.

2 No. 1, 1874, p. 34.

3 Geol. Mag., dec. iii., vol. vi., 1889, p. 25, fig. 2.

4 Proc. Zool. Soc. (1896), 1897, p. 1033, woodcut, fig. 3.

arm almost halberd-shaped. The distal margin is twice notched, and the proximal margin is circularly excavated, so that the podial area is almost elliptical. The podial orifices are thus represented in the negative cast by a double series of elliptical to subquadrate rounded prominences, separated by the sinuous ridge-like cast of the ambulacral furrow. The ambulacral ossicles are fusiform and curved, the pointed proximal end being directed inwards. The ambulacral canal is flexuose and bordered by the curved inner margins of the ambulacrals. The ambulacral ossicles are sometimes thicker than here drawn, and have the notches more pronounced. The adambulacral plates are generally so close as to form an almost uninterrupted marginal border. No trace of a disc has been detected in the specimens before us, and the spines, if any, have not been preserved.

Measurements of specimens in National Museum.

	Spec. A.	Spec. B.	Spec. C.
Length of arm	20 mm.	24 mm.	?
Diameter of arm at base	3 mm.	2 mm.	3.5 mm.
Diameter of arm near distal end	2 mm.	1.5 mm.	?

Occurrence.—This species is of frequent occurrence in the Silurian (Melbournian) sandstone of Moonee Ponds Creek, Flemington. It also occurs rarely in the Yeringian series at Yering.

Genus—*Gregoriura*¹ nov.

Generic characters.—A Protasterid in which the usual boot-shaped ambulacrals are laterally developed, and modified into a subtriangular form. Ossicles on each side of the ambulacral canal subalternate, excepting at the junction with the mouth-frames, where they are parallel. Adambulacral ossicles narrow, slender, extending laterally in a line with the proximal border of the ambulacral ossicle. Spine-bearing plates, slender, at right angles to the adambulacrals, carrying (in the genotype) two conspicuous spines. Oval skeleton having jaw-plates $\frac{3}{4}$ the length of the mouth-frames; teeth thick and prominent. No traces of a disc preserved in the specimen on which the genus is founded. Arms very slender and very flexible.

¹Named after Professor J. W. Gregory, F.R.S., who has devoted so much attention to the elucidation and classification of this group of the echinodermata.

Gregoriura spryi, gen. et sp. nov.

(Pl. VI., Fig. 1; Pl. VIII., Figs. 1, 3).

Description.—This species is quite the largest ophiurid known from Australian rocks, since it must have covered a circular area having a diameter of at least 72 mm. The oral framework is well-preserved as a limonitic cast, the five rhomboidal groups being distinctly separate. The angle made by the junction of the elements composing the mouth-frame and the jaws is strongly marked. The jaw plates are laterally slightly concavo-convex. The mouth-frames near the junction of the arms are partly supported by the embracing character of the ambulacrals. The ossicles of the arm consist of subtriangular ambulacrals having a sinus on the distal face for the passage of the podia, whilst the proximal face is broadly excavated; extending from the proximal end of each ambulacral is a slender ambulacral, and apparently fused to this, and at right angles, is a spine-bearing plate, having generally two strong spines, one directed outwards, the other towards the arm tip.

Dimensions.—

Length of longest arm	-	-	-	-	32 mm.
Width of arm at base	-	-	-	-	3 mm.
Length of ambulacral ossicles	-	-	-	-	circá 1 mm.
Length of syngnaths	-	-	-	-	1.75 mm.

Observations.—The above type specimen is named in recognition of its finder, Mr. F. P. Spry, who has kindly presented it to the National Museum. This specimen is very nearly perfect, as it shows the whole of the oral framework and the five arms, one of the latter being only slightly damaged by fracture. The ophiurid lies on the slab of mudstone with the arms undulate and grouped toward one side. The flexure of the arms points to the particularly free character of the ossicles in regard to movement. The deposition of sediment upon this brittle-star must have been very quiet and gradual, for even the superficial contour of the central area of the animal has been preserved, showing it to have been strongly convex.

Horizon and Locality.—Silurian (Melbournian). In the blue and ochreous shale of the Yarra Improvement Works, S. Yarra.

Family—*Palaeophiuridae*.Genus—*Sturtzura*, Gregory, 1897.***Sturtzura leptosomoides*, sp. nov.**

(Pl. VII., Pl. VIII., Fig. 4).

Description.—Arms very flexible, moderately broad in the middle, very slender towards the distal end. Disc not visible in specimens now described. Mouth-frames slender, separate, shorter than the jaws. Oral framework having a diameter of 4 mm. in our examples. Ambulacral ossicles subquadrate, broader proximally, with a podial sinus on the distal and outer faces. Adambulacrals narrow, curved, fusiform, and disposed obliquely, extending outwards towards the arm-tips. Intermediate spine-bearing plates with two or three prominent spines.

Measurement of type specimen.—

Length of arm - - - - -	10 mm.
Width of arm at broadest part, viz., 3 mm. } from junction with mouth-frame - }	2.25 mm.
Diameter of oral pentagon - - -	2.5 mm.

Observations.—*P. brisingoides* was selected by Gregory as the type of the above genus,¹ but since that species appears to require a somewhat different explanation as to its arm structure, which is related to that of the protasterids, as already shown here, *Sturtzura leptosoma*, Salter sp.,² must now be regarded as the type form. The present species resembles, at first sight, *S. leptosoma* of the Ludlow beds of the Welsh border so closely that the English and Victorian fossils appeared to be one and the same species. Upon examining their arm-structure, however, it is seen that although generically related, the forms are specifically distinct (see pl. viii., figs. 4, 5).

Horizon and Locality.—Silurian (Melbournian), Moonee Ponds Creek, Flemington. Geol. Surv. Coll.

1 Proc. Zool Soc. (1896), 1897, p. 1034.

2 Ann. Mag. Nat. Hist., ser ii., vol. xx., 1857, p. 331, pl. ix., fig. 5.



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F.C. PHOT.

Silurian Ophiurids. Victoria.